

(12) UK Patent Application (19) GB (11) 2 209 859 (13) A
(43) Date of A publication 24.05.1989

(21) Application No 8819294.3

(22) Date of filing 12.08.1988

(30) Priority data
(31) 8721739 (32) 16.09.1987 (33) GB

(71) Applicant
United Kingdom Atomic Energy Authority
(Incorporated in the United Kingdom)

11 Charles II Street, London, SW1Y 4QP,
United Kingdom

(72) Inventor
Steven Frank Hall

(74) Agent and/or Address for Service
J E Alderman
Patent Branch, United Kingdom Atomic Energy
Authority, 11 Charles II Street, London, SW1Y 4QP,
United Kingdom

(51) INT CL*
H04Q 9/00

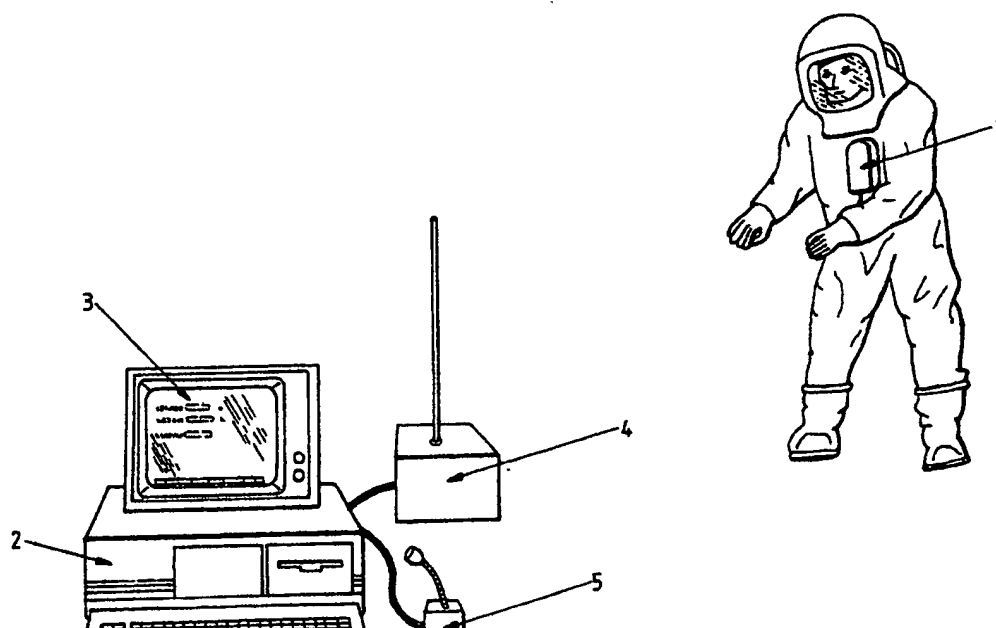
(52) UK CL (Edition J)
G4H HNEE H13D H14A H14B H14D H14G H60
U1S S2191 S2311 S2312

(56) Documents cited
None

(58) Field of search
UK CL (Edition J) G4H HNEA to HNEJ HNEL HNEM
INT CL* H04Q

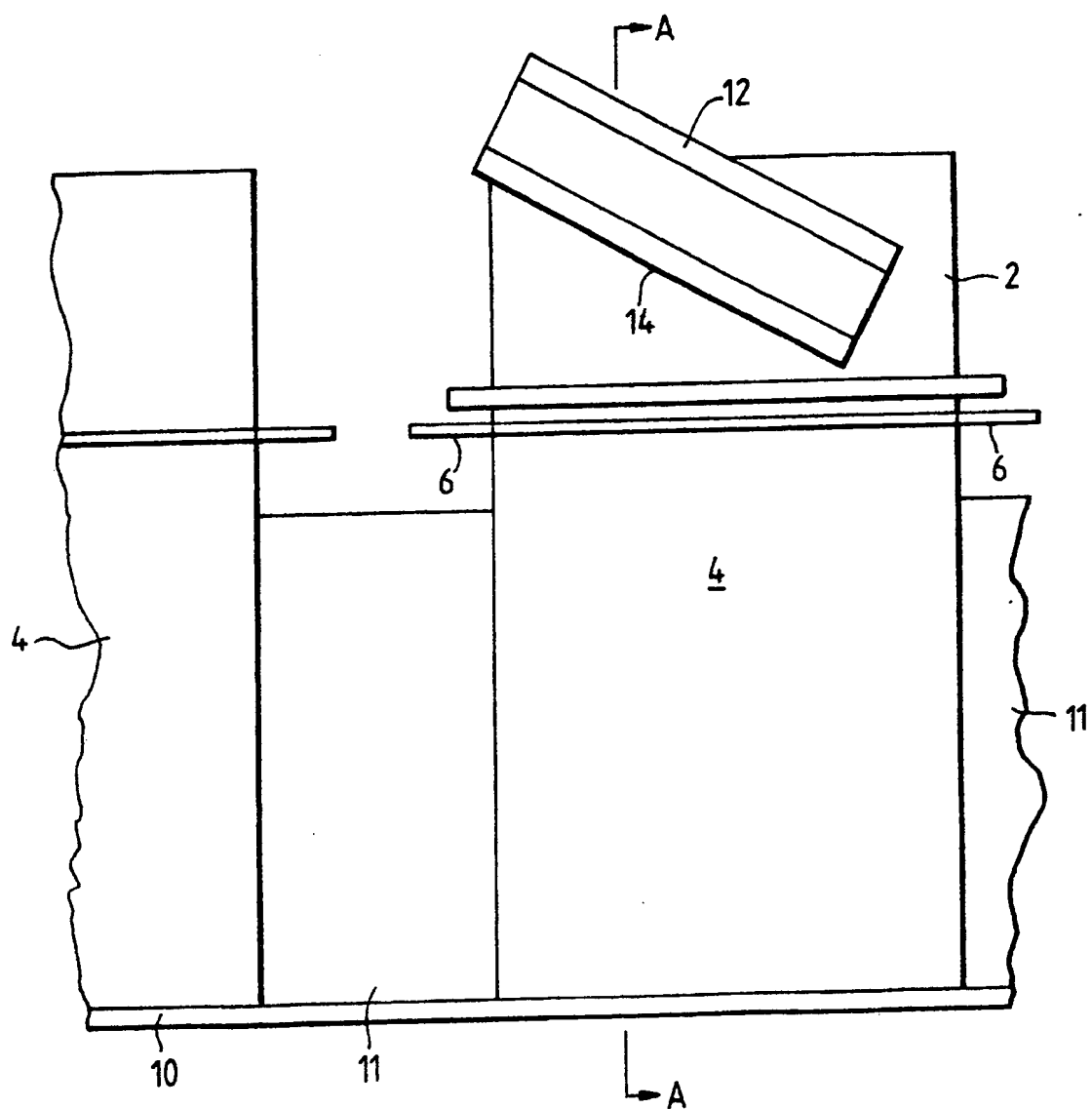
(54) Monitoring of personnel in working environments

(57) Personnel working in environments in which they may be exposed to health risks are equipped with dosimeters 1 which may incorporate a Geiger counter. The dosimeter is linked by radio with a central remotely located monitoring station 2-5 programmed to interrogate each dosimeter periodically to read the count accumulated over the period between scans, and operate an audio signalling device so that the operative is reassured that monitoring is taking place. After each reading, the monitoring station produces a signal which resets an internal counter of the dosimeter. The central station monitors each operative's dose in terms of dose accumulated and dose rate and at a predetermined threshold level, a signal is transmitted to the relevant dosimeter so the operative can take appropriate action.



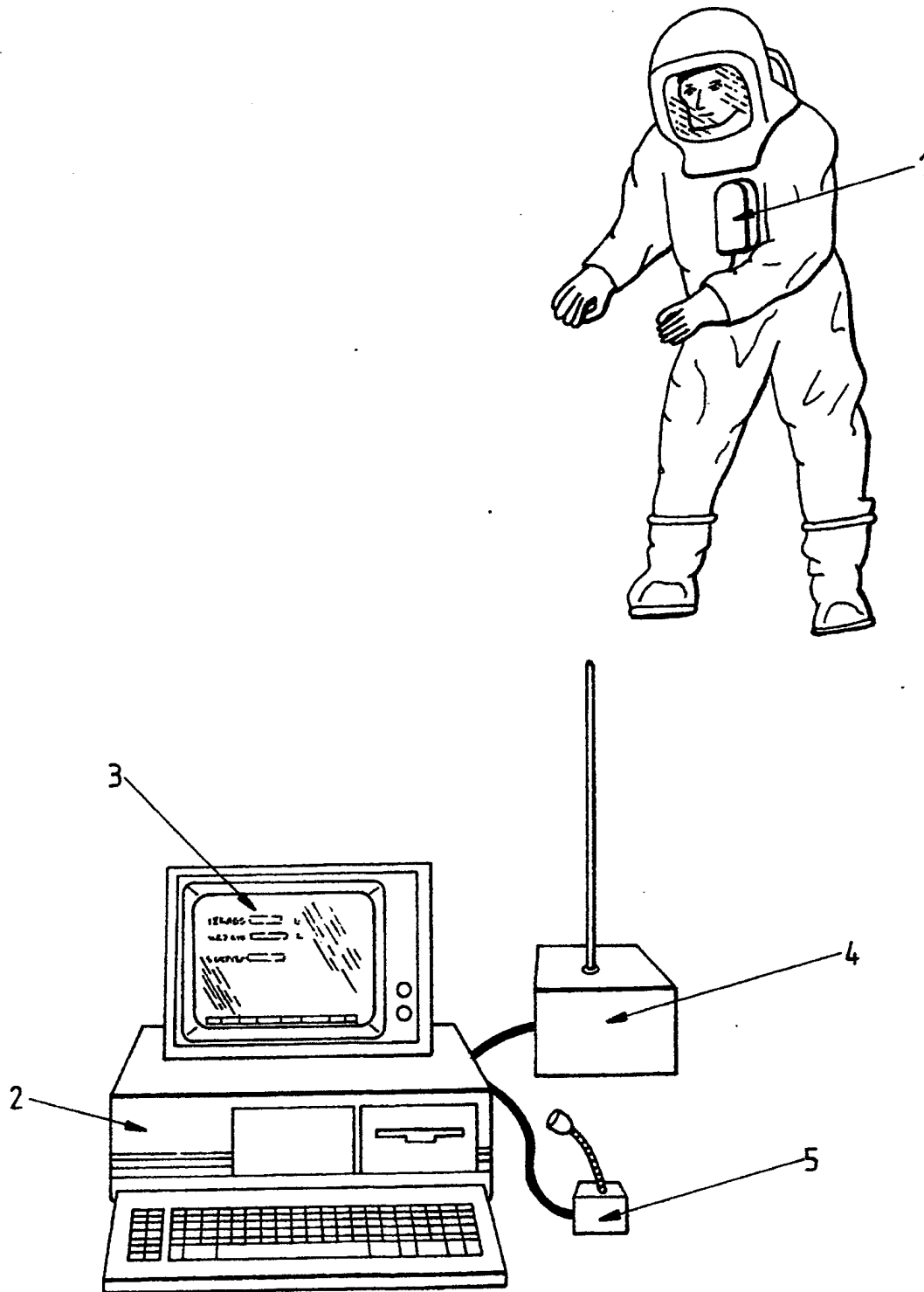
GB 2 209 859

Fig. 1.



2209859

2/2



2209859

Monitoring of personnel in working environments

This invention relates to a system for the monitoring of personnel in working environments, particularly in circumstances where such personnel are carrying out work in an environment in which they are exposed to health risks if unduly exposed to the environment.

An extreme example of a situation in which the system of the invention could have usefully been employed was the nuclear reactor accident at Chernobyl, USSR in 1986. As a result of the Chernobyl accident, 31 people died, 29 of these died from acute radiation syndrome and a further 180 required hospital treatment for acute radiation syndrome from which they subsequently recovered. All of these 203 people were firemen or other emergency workers coping with the immediate aftermath of the accident and working in areas of high radiation.

Most or indeed all of these injuries and deaths could have been avoided if the radiation exposure of these workers had been known by those directing the emergency response at the time of the exposure.

According to one aspect of the invention there is provided a system for the monitoring of personnel in working environments comprising: a plurality of portable sensor devices to be carried or worn by each of the personnel, each sensor device incorporating a radio transmitter/receiver and signalling means and being

arranged to detect and measure an entity presenting a danger to humanity; and a central computer-controlled monitoring station including radio transmitter/receiver means for periodically interrogating each of the sensor devices via the radio links to obtain, from each sensor device, the measurement derived by the respective sensor device between interrogations, means for triggering operation of the signalling means of each device each time an interrogation is made, and means for accumulating for each device the measurements retrieved whereby the exposure of the operative carrying the device can be monitored. The entity may be radiation.

Thus, if a particular operative is found to have received exposure approaching a predetermined threshold he may be instructed via the radio link to withdraw from the environment in which he is working or transfer to a different area where the exposure level is lower.

To promote further understanding of the invention, one embodiment will now be described by way of example only with reference to accompanying schematic drawing.

As shown, each worker has a portable dosimeter comprising a radiation detector (eg a Geiger tube) and counter controlled by a microprocessor, the counter serving to accumulate the count received from the detector. The dosimeter also has a VHF-FM radio transmitter and receiver which are under the control of the microprocessor. Each of these remote dosimeters is

controlled from a central station which comprises a microcomputer 2 and a VHF-FM radio transmitter and receiver 4.

At the start of the operation each worker is issued
5 with a dosimeter and his name and the number of the dosimeter entered in the microcomputer. Thereafter the dosimeter is polled periodically and automatically by the microcomputer by means of the VHF-FM radio link in the following manner.

10 The central station microcomputer 2 sends out an instruction over the radio link for a given dosimeter to transmit its received radiation dose since last time it was polled. This dose is derived from the counter associated with the built-in microprocessor. The
15 dosimeter obeys this instruction and at the same time gives the emergency worker an audible signal through headphones that this has occurred. This is to reassure him that the system is operational. The communications hardware and software is arranged so that a high degree
20 of reliability is achieved through the use of appropriate protocols.

On receipt of the signal from the nominated remote dosimeter the control station microcomputer updates its record for the particular worker and displays the current
25 cumulative dose graphically on the VDU 3. Also displayed are maximum dose allowed and time remaining before the limit is reached at the current dose rate.

The central station then generates a signal to reset the counter of the dosimeter just polled and goes on to poll the other remote dosimeters in turn. The entire sequence is thereafter repeated, each polling cycle
5 taking for instance 1 to 2 seconds.

By this means the central station has virtually instantaneous data on the individual dose rates and cumulative doses received by the workers being monitored.

10 The central station is also equipped with a microphone 5 and the computer can send a message to a given remote dosimeter (or indeed all the remote dosimeters at the same time) to receive a voice message from the controller which is then relayed to the worker.
15 via headphones worn by each worker and connected to the respective dosimeter.

Because the dose received by each worker is known at the time it is being received he can be recalled or redeployed when his cumulative dose nears a prescribed
20 limit and hence using this system the controller can efficiently deal with a particular emergency while ensuring that none of the workers under his control receive exposure above a prescribed level within safety limits.

25 Although, as described above, the system is intended for use in situations involving exposure to radiation, the invention also has application to situations involving

biologically hazardous environments such as chemicals,
toxic gases etc.

5

14254

10

15

20

25

Claims

1. A system for the monitoring of personnel in
working environments comprising: a plurality of portable
sensor devices to be carried or worn by each of the
5 personnel, each sensor device incorporating a radio
transmitter/receiver and signalling means and being
arranged to detect and measure an entity presenting a
danger to humanity; and a central computer-controlled
monitoring station including radio transmitter/receiver
10 means for periodically interrogating each of the sensor
devices via the radio links to obtain, from each sensor
device, the measurement derived by the respective sensor
device between interrogations, means for triggering
operation of the signalling means of each device each
15 time an interrogation is made, and means for
accumulating for each device the measurements retrieved,
whereby the exposure of the operative carrying the device
can be monitored.
2. A system for the monitoring of personnel in
20 working environments substantially as hereinbefore
described with reference to the accompanying drawing.

14254